WEST

Generate Collection | Print

L7: Entry 1 of 3

File: USPT

Aug 25, 1998

DOCUMENT-IDENTIFIER: US 5798733 A
TITLE: Interactive position guidance apparatus and method for guiding a user to reach a predetermined target position

Brief Summary Paragraph Type 1 (13):
third means for determining, after each predetermined time interval, the current position of the parachute jumper based upon the received input position information and for determining, after each predetermined time interval, the predicted destination of the parachute jumper based upon the received input position information and the prestored jump profile information;

Detailed Description Paragraph Right (5):
The ORIENT button 14 is the first button pressed before a jump starts. The JUMP button 12 is depressed just before the parachute jumper jumps from an air platform and begins his descent. This button activates the calculation and display of the predicted destination position versus the target position or desired drop zone, based on calculations from a global positioning system (GPS) receiver, magnetic north, and inputs from an electronic compass and a digital altimeter. The DOWN button 18 is depressed after the jump is complete and terminates the jump phase of operations, stopping the calculation and display of the predicted destination position and maintaining other displayed information. Finally, the LIGHT button 16 activates/deactivates the lighting of the display 20.

Detailed Description Paragraph Right (6):
FIG. 3 illustrates the components of the position guidance apparatus 100 of the first embodiment of the present application. The position guidance apparatus 100 includes a GPS receiver 200, which in turn includes a GPS antenna 95 and a GPS computer processing unit (CPU) 90. The GPS antenna 95 can alternatively be in the form of unit separate from the position guidance apparatus 100, and can be mounted on a different location of the user, such as in a backpack of the user as will be described in later embodiments of the present application. The GPS CPU 90 includes appropriate position calculating information necessary for obtaining a GPS longitude/latitude fix, and for updating longitude/latitude information as the user begins descent of the jump. Alternatively, the GPS CPU 90 can be integrated into the CPU 30, which is the main CPU of the position guidance apparatus itself.

Detailed Description Paragraph Right (7):
As shown in FIG. 3, the position guidance apparatus 100 further includes a centrally located CPU 30 which receives GPS signals form GPS receiver 200. The CPU 30 is further connected to an electronic compass 80 and digital altimeter 70 to receive directional and altitude signals therefrom. It should be noted that similar to the GPS antenna 95, the position guidance apparatus 100 can include an integral electronic compass 80 and digital altimeter 70, or can alternatively include a separate electronic compass 80 and/or digital altimeter 70 which are separately located on another part of the user, such as in the backpack for example. The CPU 30 acts as a device for receiving positioning signals including longitude, latitude and altitude from the GPS receiver 200, electronic compass 80 and digital altimeter 70. These signals are preferably continually updated each time a predetermined time interval (of one (1) second for example) expires so that the CPU 30 constantly receives updated positioning signals as the parachute jumper is descending at a rate of once per second.

Detailed Description Paragraph Right (9):

The acquisition of GPS signals and other input position information signals allows the CPU 30 to compute and recompute longitude, latitude and altitude information as displayed on display 20 as shown in FIG. 2. Receipt of the aforementioned data allows the CPU 30 to compute current position information, target information, and predicted destination position information, based on prestored target position information, the aforementioned input received input position information, and prestored jump profile information. The electronic compass 80 is used to provide a continuous orientation value to the position guidance apparatus so that the map display can be constantly reoriented to always to be aligned to magnetic north, no matter how the arm of the parachute jumper flaps about.

Detailed Description Paragraph Right (10):
FIG. 4 illustrates a fall curve of a parachute jumper jumping from a plane and eventually landing on the ground. FIG. 4 further illustrates a GPS satellite maintaining communication with the parachute jumper throughout descent of the jump, so that constant information regarding current position, target position, and predicted destination position can be calculated. Operation of the position guidance apparatus is as follows.

Detailed Description Paragraph Right (13):
FIG. 6 illustrates both the pre-mission operations and other operations which take place during the mission, regarding the position guidance apparatus 100. Initially, in step S3, the unit is turned on as the jump point is approached and the jump profile information, flight profile information, area maps, and designated target position information are downloaded from internal memory storage in the plane to the position guidance apparatus 100 and are stored in memory therein. When on final approach to the jump point, the user then plugs the position guidance apparatus 100 into an antenna lead connected to an external GPS compatible antenna located on the airplane. The ORIENT button 14 is then depressed and a GPS latitude/longitude fix is obtained in step S4. Pre-jump phase operations are then performed in step S5, the details of which are shown in FIG. 6b and will be described hereafter. A jump warning is then indicated (displayed and/or audibly indicated) to the user and the JUMP button 12 is thereafter depressed in step S6 after the user disconnects from the external GPS compatible antenna. The user thereafter exits the air platform of the plane. Various jump operations thereafter occur in step S7, the details in which are shown in FIG. 6c and will be described hereafter, wherein target position, current position, and predicted destination position of the parachute jumper are determined and displayed to a user during his descent. The user is then able to change his fall profile as required to land in the target position throughout the free-fall and parachute parts of the jump based upon instruction information received from a display on a display 20 of the position guidance apparatus 100. Thereafter, upon landing, the user pushes the DOWN button 18 in step S8, stopping calculations and display of the predetermined destination position, and maintaining other displayed information. Operations end in step S9. The position guidance apparatus 100 can thereafter be used as a compass and GPS unit combined with terrain map display for use in completing a ground phase portion of a mission. Thus, at the end of operation in step S9, although the jump phase calculations have been stopped upon the operator pushing the DOWN button in step S8, the position guidance apparatus continues map display of terrain, current position, and target position for the use of continuing the ground phase of the mission.

Detailed Description Paragraph Right (21):
Initially, upon the system being turned on, the system BIT (Built-In Test) is performed in step S406. The position guidance apparatus 100 is then plugged into an antenna lead connected to an external GPS antenna and the ORIENT button is pressed in step S407 before main pre-jump calculations of FIG. 6b begin, to obtain GPS longitude/latitude fix. Then, the mission profile information is loaded in step S408. The system then officially moves to the pre-jump phase of performing pre-jump calculations based on input information received prior to the parachute jump occurring, as described after step S468 in FIG. 6b of the present application. The mission profile information includes the aforementioned area maps, flight profile, jump profile, and target position and drop zone information.

Detailed Description Paragraph Right (23):
Further, after loading in the mission profile information in step S408, the system

also monitors for a GPS signal in step S416. In step S418, it is determined whether or not a GPS signal has been acquired. If so, in step S420, the GPS position is monitored and filtered and is output to step S430 and is integrated into the position data.

Detailed Description Paragraph Right (24):
Finally, also after loading in the mission profile in step S408, the system monitors for platform position feed in step S422. The airplane can have a much better navigation system that can send messages to the position guidance apparatus 100, including position and altitude data. This may be needed because the GPS signal will probably be blocked inside the plane.

Detailed Description Paragraph Right (26):
After the aforementioned information has been integrated into the position data in step S430, the aforementioned information including altimeter value, GPS position, and platform position information obtained in respective steps S414, S420, and S428, the integrated position data is fed back into the system and the aforementioned steps are occurring subsequent to step S408 are repeated. Further, the integrated position data from step S430 is simultaneously sent to step S432 and is used to calculate current position of the user, who is still travelling in the plane at this time.

Detailed Description Paragraph Right (31):
During the actual parachute jump, the position guidance apparatus 100 continually receives signals from the GPS receiver 200, the electronic compass 80, and the digital altimeter 70. The received altimeter value is monitored and filtered in step S460, and the received GPS position signals are received in step S462. Position data from step S460 and S462 are then integrated in step S464. Thus, during the jump itself, the position guidance apparatus 100 receives longitude, latitude and altitude input position information. The system then feeds back to await receipt of new input information. It should be noted that input information is received and current position is updated on a continuous basis, after a predetermined time interval (one second) has passed for example. It should be noted that the GPS position signals will update at an interval set by the manufacturer (one (1) second or less) and the position guidance apparatus 100 will update position calculations/display once per second. Accordingly, after each predetermined time interval, current position is thereafter calculated or recalculated in step S466 based upon the integrated position data of step S464.

Detailed Description Paragraph Right (42):
Accordingly, current position x.sub.o, y.sub.o and current altitude a.sub.o, can be determined in step S466 from the longitude and latitude position signals received from the GPS receiver in step S462 and from altitude position signals received from the altimeter in step S460. Thereafter, the jump path information, including the time until the parachute jumper will reach the ground ta is calculated in step S468. The predicted destination position x.sub.p, y.sub.p can then be calculated in step S470, wherein each of the current position, target position, and predicted destination positions can be displayed in steps S474, S482 and S486.

Detailed Description Paragraph Right (51):
FIG. 11 illustrates alternative embodiments of the present application. In one alternate embodiment, for example, the GPS receiver 200 can be a separate unit mounted on the top of a backpack of a user, for example. Similarly, the digital altimeter 70 can also be a separate device mounted on the top of the backpack as shown in FIG. 11. Further, the main computing unit 35, including all the components of FIG. 3 except the aforementioned components and display 20 and keypad 10, can also be housed in the backpack as illustrated in FIG. 11. The main computing unit 35 can then be wired to the arm display unit 110, including the display 20 and keypad 10, as well as to the digital altimeter 70 and GPS antenna 200.

Detailed Description Paragraph Right (54):
FIGS. 12a and 12b illustrate various alternative configurations of the components of the position guidance system of the present application. FIG. 12a illustrates a main computing unit 35 which is stored in a backpack for example, connected to an arm display unit 110, a separate digital altimeter 70, GPS antenna 200 and a GPS receiving unit 90. FIG. 12a further illustrates the headset 500 and the head mounted display 600, also connected to the main computing unit 35.

Detailed Description Paragraph Right (55):
FIG. 12b illustrates another embodiment of the components of the position guidance system of the present application, including a main computing unit 35 housable in a backpack, connected to a separate GPS antenna 200, digital altimeter 70, an arm display unit 110. Headset 500 and head mounted display 600 are also illustrated, and are connectable to the main computing unit 35.

Detailed Description Paragraph Right (56):
Alternative uses for the position guidance system of the present application include interfacing the apparatus to new and existing "smart" tools including a team radio, digital camera, pop-up floating GPS antenna, laser range-finder/compass, and/or sonar navigation system. Existing military communication software added to the position guidance system of the present application could provide for message formatting and automated messaging on standard military radios and networks via known interfaces for example. If satellite links are being used, the position guidance system of the present application could provide notification to the operator when the next transmit/receive window is available, for example.

Detailed Description Paragraph Right (57):
Utilizing a laser range-finder/compass, information to locate an enemy person or asset could be detected. Initially, the position guidance system would store GPS position information, the combatant would zap the enemy asset with the laser range-finder/compass, data could be stored until off-loaded to the position guidance apparatus 100 and data could be combined with the GPS data to exactly locate the enemy asset. Use of infrared communicational links between the position guidance system and other systems could further reduce the amount of wiring needed to provide appropriate communication links.

Detailed Description Paragraph Right (58):
Finally, regarding sonar information, the position guidance system of the present application could utilize a pop-up GPS antenna along with an underwater compass to guide an underwater diver in a manner somewhat similar to the aforementioned guidance of the parachute jumper described previously regarding the position guidance apparatus 100.

CLAIMS:

31. An interactive position guidance apparatus for aiding a parachute jumper in reaching a predetermined target position comprising:

first means for prestoring target position information of the predetermined target position and for prestoring jump profile information;

second means for receiving input position information at predetermined time intervals;

third means for determining, after each predetermined time interval, the current position of the parachute jumper based upon the received input position information and for determining, after each predetermined time interval, the predicted destination of the parachute jumper based upon the received input position information and the prestored jump profile information;

display means for displaying the predetermined target position, the current position, and the predicted destination of the parachute jumper, wherein display of the current position and predicted destination of the parachute jumper is updated after each predetermined time interval; and

calculation means for calculating, after each predetermined time interval, a difference between the predetermined target position and the predicted destination of the parachute jumper, wherein the display means further displays instruction information to minimize the calculated difference between the predetermined target position and the predicted destination of the parachute jumper.

L10: Entry 3 of 19 File: USPT Nov 2, 1999

DOCUMENT-IDENTIFIER: US 5974675 A
TITLE: Navigation unit

Abstract Paragraph Left (1):
A navigation unit having a gyro sensor mounted thereon. The unit includes a mounting mechanism for changing the mounting direction of the gyro sensor so that the rotation detecting axis of the gyro sensor may be vertical, i.e. normal to a vehicle. In one embodiment, the navigation unit includes a support device for supporting the gyro sensor rotatably with respect to a casing. The gyro sensor may be supported in a rocking manner in the casing, and mounted to be changed between a first mounting direction and a second mounting direction perpendicular to the first mounting direction. In the preferred construction, the gyro sensor has a first pin and a second pin, and the casing has a first guide groove for receiving and guiding the first pin, and a second guide groove extending perpendicular to the first guide groove for receiving and guiding the second pin. The second guide groove provides a rocking center for the gyro sensor.

Brief Summary Paragraph Right (2):
The present invention relates to a navigation unit, and, more particularly, to a navigation unit having a selectively positionable gyro sensor mounted therein.

Brief Summary Paragraph Right (4):
Navigation systems for use in vehicles are conventionally constructed to include: a display device having a display for displaying data; a control unit allowing a driver to input data; a receiver for using a variety of media; a CD-ROM driver for using a CD-ROM; and a navigation unit for supervising the entirety of the navigation system. The navigation unit includes a variety of electronic parts such as a CPU, a memory and an interface, a card holder for holding a feature expansion PC card, and a gyro sensor for detecting the direction of travel of the vehicle. The navigation unit is usually mounted in a trunk of the vehicle, and is connected with the receiver and the CD-ROM driver, also mounted in the trunk, and with the display device mounted in the passenger compartment near the driver's seat.

Brief Summary Paragraph Right (5):
Conventional navigation units, however, have such a large size and occupy so much space that they are difficult to mount on a vehicle. In order to improve the mountability, therefore, attempts have been made to provide a navigation unit which can be installed either horizontally or vertically on the vehicle. However, since the gyro sensor must have its rotation detecting axis vertical at all times, it cannot be used in a navigation unit which can be installed either horizontally or vertically. Thus, in these navigation units the gyro unit having the gyro sensor is made separate from the remainder of the navigation unit so that the gyro unit is installed directly on the vehicle. In this latter case, however, the total space occupied by the navigation unit and the gyro unit is enlarged. In addition, the work for installing the gyro unit directly on the vehicle is troublesome, and communication circuits or the like are required between the navigation unit and the gyro unit, thus raising cost.

Brief Summary Paragraph Right (6):
Navigation units have also been constructed for horizontal installation with two gyro sensors, having different mounting directions, mounted therein. In this construction, when one gyro sensor is mounted vertically in the navigation unit, the other gyro

sensor can also be used. However, the two gyro sensors must be mounted in advance in the navigation unit, thus increasing cost and occupied area.

Brief Summary Paragraph Right (7):
Thus an object of the present invention is to solve the aforementioned problems of the navigation units of the prior art by providing a navigation unit which has its gyro sensor oriented in a vertical direction, regardless of the orientation of the navigation unit as installed.

Brief Summary Paragraph Right (8):
Another object of the present invention is to provide a navigation unit which is of a lower cost and reduced size compared to that of the prior art.

Brief Summary Paragraph Right (10):
The navigation unit of the present invention has a gyro sensor mounted thereon. A mounting mechanism is provided for changing the mounting orientation of the gyro sensor so that the rotation detecting axis of the gyro sensor is in a vertical direction, normal to the vehicle.

Brief Summary Paragraph Right (11):
In one embodiment, the navigation unit further has: support means for supporting a gyro sensor rotatably with respect to a casing; and mounting means for fixing the gyro sensor, as placed in a predetermined mounting direction, so that the rotation detecting axis of the gyro sensor is fixed in the vertical. The gyro sensor may be supported in a rocking manner in the casing, allowing it to be mounted in a first mounting direction or in a second mounting direction perpendicular to the first mounting direction. In this construction, the gyro sensor has a first pin and a second pin, and the casing has a first guide groove for receiving and guiding the first pin, and a second guide groove extending perpendicular to the first guide groove for receiving and guiding the second pin. The second guide groove provides a rocking center for the gyro sensor at its end portion.

Drawing Description Paragraph Right (2):
FIG. 1 is an end view of a navigation unit according to the present invention showing a first support state of the gyro sensor;

Drawing Description Paragraph Right (3):
FIG. 2 is an end view of a navigation unit according to the present invention showing a second support state of the gyro sensor;

Drawing Description Paragraph Right (4):
FIG. 3 is a perspective top plan view of a navigation unit according to the present invention;

Drawing Description Paragraph Right (5):
FIG. 4 is a perspective back elevation of a navigation unit according to the present invention;

Drawing Description Paragraph Right (9):
FIG. 8 is a lefthand side elevation of the navigation unit according to the present invention, when installed horizontally;

Drawing Description Paragraph Right (10):
FIG. 9 is a top plan view of the navigation unit of FIG. 8;

Drawing Description Paragraph Right (11):
FIG. 10 is a lefthand side elevation of the navigation unit according to the present invention, when installed horizontally;

Drawing Description Paragraph Right (12):
FIG. 11 is a back elevation of the navigation unit of FIG. 10; and

Detailed Description Paragraph Right (2):
With reference to FIGS. 3 and 4, the navigation unit 1 of the present invention includes a casing 11 composed of a bottom wall 11a, side walls 11b and 11c, a top wall

11d, a back wall 11e and a front wall 11f. A PC board 12 is arranged parallel to bottom wall 11a of the casing 11. The PC board 12 is equipped with a card holder 13 for holding a feature expansion PC card (not shown) and a variety of electronic parts such as a CPU, a memory or an interface (not shown).

Detailed Description Paragraph Right (3):
The navigation unit further includes: a GPS 15 for detecting the present location of the vehicle; a connector 17 for a flexible cable; pin jacks 18, 19; an RGB 20 output; a feature expansion connector 21; a connector 22 for a communications system; a connector 23 for a vehicular power source; an antenna connector 24; a connector 25 for a remote control eye; and a gyro sensor 31 for detecting the direction of travel of the vehicle. The navigation unit thus constructed has a large size and occupies considerable space, making mounting of the unit difficult. In order to improve mountability, the navigation unit is designed so that it can be installed with its base 11f either horizontal or vertical.

Detailed Description Paragraph Right (4):
Specifically, when the navigation unit is to be installed horizontally, the bottom wall 11a is positioned facing (parallel to) the floor of the vehicle. When the navigation unit is to be installed vertically, the back wall 11e is positioned parallel to the floor. For vertical installation, a predetermined gap is left between the back wall 11e and the floor of the vehicle to accommodate the connectors 21, 22, 23, 24 and 25 which protrude from the back wall 11e. The mounting direction of the gyro sensor 31 can also be changed by 90.degree. to accommodate both horizontal and vertical installation.

Detailed Description Paragraph Right (5):
As shown in FIGS. 5 to 7, the gyro sensor 31 is equipped with a body 33 and a bracket 34 fixed on one face (i.e. the front face) of the body 33. To the bracket 34, there are attached a first pin 35 acting as a knob for changing the mounting direction of the gyro sensor 31, and a second pin 36 arranged orthogonally of the first pin 35. Also, threaded holes 38 and 39 for fixing the gyro sensor 31 in one of the individual mounting positions are formed on an orthogonal line of the bracket 34. As shown in FIGS. 6 and 7, reference letters CN designate the rotation detecting axis of the gyro sensor 31.

Detailed Description Paragraph Right (7):
Specifically, when the navigation unit is to be installed horizontally, as shown in FIGS. 8 and 9, the top wall 11d is placed uppermost with the bottom wall 11a in a lower position. By arranging the first pin 35 and the second pin 36 at the side of the upper top wall 11d and at the side of the lower bottom wall 11a, respectively, the gyro sensor 31 is mounted in the first mounting direction so that the rotation detecting axis CN of the gyro sensor 31 is positioned vertically.

Detailed Description Paragraph Right (8):
When the navigation unit is to be installed vertically, as shown in FIGS. 10 and 11, the front wall 11f (as shown in FIG. 3) is placed uppermost with the back wall 11e in a lower position. By arranging the second pin 36 at the side of the upper front wall 11f and the first pin 35 at the side of the lower back wall 11e, the gyro sensor is mounted in the second mounting direction so that the rotation detecting axis CN of the gyro sensor 31 is positioned vertically.

Detailed Description Paragraph Right (14):
Thus, merely by moving the first pin 35 linearly along the first guide groove 46, the mounting direction of the gyro sensor 31 can be changed between the first and second positions so that the navigation unit can be installed both horizontally and vertically with the gyro sensor 31 being mounted thereon. Unlike the navigation unit of the prior art, the gyro unit having the gyro sensor according to the present invention need neither be manufactured separately of the navigation unit nor be installed directly on the vehicle. As a result, the navigation unit is not enlarged in its occupation area so that its mounting can be simplified. Moreover, neither the case of the gyro unit nor the communications circuit, or the like, between the navigation unit and the gyro unit are needed so that the cost can be lowered. Also, two gyro sensors, i.e. one for each mounting direction, need not be arranged in the casing 11. The cost and size of the unit are, thus, reduced compared to the prior art.

CLAIMS:

1. A vehicle navigation unit comprising:

a casing for attachment to a vehicle with one wall member of said casing either vertical or horizontal;

a gyro sensor, having an axis of rotation, for detecting travel direction of the vehicle; and

mounting means for rotatably supporting said gyro sensor within said casing for rotation between a first mounting position wherein said axis of rotation is oriented vertically and parallel to said one wall member, with said one wall member vertically oriented, and a second mounting position wherein said axis of rotation is oriented vertically and perpendicular to said one wall member, with said one wall member horizontally oriented.

2. A vehicle navigation unit comprising:

a gyro sensor for detecting travel direction of a vehicle, said gyro sensor having, extending therefrom, first and second pins; and

mounting means for mounting said gyro sensor within a casing, said mounting means including a first guide groove in the casing for receiving and guiding said first pin and a second guide groove extending perpendicular to said first guide groove in the casing for receiving and guiding said second pin, and wherein said second guide groove provides a rocking center for said gyro sensor.

3. A vehicle navigation unit according to claim 2:

wherein said casing is attachable to the vehicle with one wall and

wherein said mounting means rotatably supports said gyro sensor within said casing for rotation between a first mounting position wherein said axis of rotation is oriented vertically and parallel to said one wall member, with said one wall member vertically oriented, and a second mounting position wherein said axis of rotation is oriented vertically and perpendicular to said one wall member, with said one wall member horizontally oriented.

WEST

Generate Collection Print

L10: Entry 2 of 19 File: USPT Nov 23, 1999

DOCUMENT-IDENTIFIER: US 5987986 A
TITLE: Navigation grade micromachined rotation sensor system

Parent Case Paragraph Right (2):
This invention relates generally to rotation sensors for use in applications such as navigation. In particular this invention relates to a rotation sensor system that provides high accuracy while operating in the high G, high vibration environment of reentry vehicles and the like. Still more particularly, this invention relates to a rotation sensor system based on a silicon chip that includes Coriolis acceleration sensors for measuring rotation rates about two orthogonal sensing axes.

Parent Case Paragraph Right (3):
Previously known micromachined Coriolis rotation sensor systems have demonstrated bias repeatability in the 10.degree. to 1000.degree./hr range. Based on an analysis of these concepts, it does not appear credible that their performance could be improved by three to five orders of magnitude to produce a high-accuracy navigation grade device, while meeting the low cost and high reliability objectives presently set for the rotation sensor system of the present invention.

Brief Summary Paragraph Right (2):
The rotation sensor according to the present invention is preferably a closed loop angular rate sensor which provides a digital delta theta output signal. The micro-inertial rotation sensor according to the present invention is designed to operate in the high G, high vibration environment associated with high lift-to-drag reentry vehicles and hypersonic submunitions. The rotation sensor according to the present invention comprises at least one solid state sensing element and is also designed to have small size and low weight, very low cost, low power, high reliability and for use in both commercial and military applications.

Brief Summary Paragraph Right (5):
A two axis rotation sensor according to the invention comprises a base and a drive member mounted to the base and formed of a single, silicon wafer having a pair of oppositely-facing planar surfaces. The drive member includes a frame and a drive member central portion connected to the frame and arranged to have rotational compliance between the frame and the central portion about an axis perpendicular to the planar surfaces of the silicon wafer. The drive member further comprises a plurality of electrodes formed on at least one side of the central portion and a drive apparatus for applying drive signals to the plurality of electrodes. The electrodes are arranged such that the drive signals cause rotational oscillation of the drive member central portion about a drive axis perpendicular to the planar surfaces of the silicon wafer.

Brief Summary Paragraph Right (6):
The two axis rotation sensor according to the invention further comprises a silicon sensing member that includes a sensing member central support member connected to the drive member central portion such that rotational oscillations of the drive member central portion are transmitted to the sensing member central portion. A sensing portion is connected to the sensing member central support member to allow the sensing portion to oscillate about the drive axis and to allow an input rotation rate about an axis perpendicular to the drive axis to produce out-of-plane oscillations of the sensing portions. Signal processing apparatus is connected to the sensing portion for producing a signal indicative of the input rotational rate as a function of the

amplitude of the out-of-plane oscillations of the sensing portion.

Brief Summary Paragraph Right (7):
The two axis rotation sensor according to the invention preferably further comprises a plurality of flexure beams connected between the frame and drive member central portion.

Brief Summary Paragraph Right (8):
The two axis rotation sensor according to the invention preferably further comprises a plurality of generally planar leaf spring members connected between the sensing member central support member and the sensing portion such that the out-of-plane oscillations in the sensing portion are perpendicular to the planes of the leaf spring members. A capacitive pickoff is preferably formed by the sensing portion such that the out-of-plane oscillations of the sensing portion produce capacitance changes in the capacitive pickoff.

Brief Summary Paragraph Right (9):
The two axis rotation sensor according to the invention preferably further comprises a plurality of base mounts connected between the base and the frame of the drive member. Each base mount is preferably formed to comprise a damped compliant element for providing a single mechanical resonant frequency in the two axis rotation sensor and for attenuating external vibration inputs.

Brief Summary Paragraph Right (11):
A two axis rotation sensor according to the invention may also comprise a pair of identical drive member/sensing portion combinations mounted together in a face-to-face relationship. Each drive member and sensing portion is formed in the manner described above. Drive signals cause the sensing portions to oscillate in opposite directions.

Drawing Description Paragraph Right (1):
FIG. 1 is an exploded perspective view of a solid state two axis rotation sensor according to the present invention;

Drawing Description Paragraph Right (12):
FIG. 12 is an exploded perspective view of a solid state single axis rotation sensor according to the present invention;

Drawing Description Paragraph Right (19):
FIG. 20B is an exploded perspective view of a dual sensor, single axis rotation sensor according to the present invention;

Drawing Description Paragraph Right (21):
FIG. 22 is an exploded perspective view of a third embodiment of a solid state single axis rotation sensor according to the present invention;

Detailed Description Paragraph Right (43):
The sensing element 362 is mounted to the support ring 360 by a pair of radially extended torsion bars 364 and 366. FIGS. 17-19 illustrate various cross sections for the torsion bars 364 and 366. A line through the torsion bars 364 and 366 defines the output axis of the rotation sensor 300.

WEST

Generate Collection | Print

L10: Entry 18 of 19 File: DWPI Nov 2, 1999

DERWENT-ACC-NO: 1998-011162
DERWENT-WEEK: 199953

TITLE: Navigation unit having gyro sensor mounted on it - has mounting mechanism for changing mounting direction of gyro sensor so that rotation detection axis of gyro sensor remains normal to vehicle

Basic Abstract Text (1):
Navigation unit comprises a mounting mechanism for changing the mounting direction of the gyro sensor so that the rotation detection axis of the gyro sensor may be normal to a vehicle,

Basic Abstract Text (3):
rotation detection axis of the gyro sensor may take a vertical direction.

Basic Abstract Text (6):
ADVANTAGE - Can be installed in both vertical and horizontal positions, and navigation unit can be installed in arbitrary direction while carrying gyro sensor.

Equivalent Abstract Text (1):
Navigation unit comprises a mounting mechanism for changing the mounting direction of the gyro sensor so that the rotation detection axis of the gyro sensor may be normal to a vehicle,

Equivalent Abstract Text (3):
rotation detection axis of the gyro sensor may take a vertical direction.

Equivalent Abstract Text (6):
ADVANTAGE - Can be installed in both vertical and horizontal positions, and navigation unit can be installed in arbitrary direction while carrying gyro sensor.

Standard Title Terms (1):
NAVIGATION UNIT GYRO SENSE MOUNT MOUNT MECHANISM CHANGE MOUNT DIRECTION GYRO SENSE SO ROTATING DETECT AXIS GYRO SENSE REMAINING NORMAL VEHICLE

WEST

Help | Logout | Interrupt

Main Menu | Search Form | Posting Counts | Show S Numbers | Edit S Numbers | Preferences | Cases

Search Results -

Terms	Documents
L9 and vehicle	19

Database:
US Patents Full-Text Database
US Pre-Grant Publication Full-Text Database
JPO Abstracts Database
EPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L10

Refine Search

Recall Text | Clear

Search History

DATE: Friday, June 14, 2002 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ		
L10	L9 and vehicle	19	L10
L9	L8 and l2	46	L9
L8	(detect$3 or sens$3 or determin$3 or indicat$3) near rotat$4 near (axis or axes)	1234	L8
L7	L6 and l2	3	L7
L6	L3 near l1	19	L6
L5	L4 and vehicle	765	L5
L4	L3 and l2 and l1	1130	L4
L3	(actual or current) near (position or location)	56175	L3
L2	gps or navigation	405575	L2
L1	time near interval	224399	L1

END OF SEARCH HISTORY